DEPARTMENT OF PESTICIDE REGULATION

PLAN FOR REDUCING EMISSIONS OF VOLATILE ORGANIC COMPOUNDS FROM

AGRICULTURAL AND COMMERCIAL STRUCTURAL PESTICIDES

"VOC Plan"

This document explains how the Department of Pesticide Regulation (DPR) plans to reduce volatile organic compound (VOC) emissions from agricultural and commercial structural pesticide applications, including how it will meet its commitments contained in California's State Implementation Plan.

I. ***BACKGROUND***

State and Federal Ozone Standards

Pesticide VOCs can contribute to the formation of ground-level ozone, which is harmful to human health and vegetation when present at high concentrations. The federal Clean Air Act requires each state to submit a State Implementation Plan (SIP) for achieving and maintaining federal ambient air quality standards, including the standard for ozone. There are State and Federal ozone standards. For ozone, the State 1-hour standard is 0.09 parts per million (ppm); the federal standard is 0.12 ppm. The State 8-hour standard for ozone is 0.07 ppm; the federal standard is 0.08 ppm.

In 1994, California's Air Resources Board and DPR developed a SIP element to reduce the pesticidal sources of VOCs ("1994 Pesticide Plan"). The 1994 Pesticide Plan was part of the State's strategy to attain the 1-hour ozone standard in five nonattainment areas (NAAs)—regions of the State that do not meet either federal or state ambient air quality standards—the San Joaquin Valley, Ventura, Southeast Desert, Sacramento Metropolitan, and South Coast Regions.

The 1994 Pesticide Plan and the 2006 Court Order

In the 1994 1-hour Ozone SIP, the Department committed to reduce VOC emissions from agricultural and commercial structural applications of pesticides from 1990 levels in the San Joaquin Valley, Southeast Desert, Ventura, Sacramento and South Coast areas. The State claimed credit for absolute percentage reductions from 1990 levels for the 1994 pesticide measure: 12% in the San Joaquin Valley by 1999 and 20% in the other areas by their respective attainment dates under the 1-hour Ozone SIP.[*]

On February 21, 2006, the United States District Court (Eastern District of California) found that DPR violated certain elements of the 1994 SIP. The Court ordered DPR to implement regulations by January 1, 2008 to achieve a 20% reduction in VOC emissions from 1991 levels.

[*] See 62 Fed. Reg. 1149, 1170 (January 8, 1997).

The pesticide VOC emission in 1990 and 1991 were:

	1990	**1991**
San Joaquin Valley	20.2 tpd average	19.4 tpd average
Southeast Desert	1.1 tpd average	0.74 tpd average
Ventura	3.7 tpd average	3.3 tpd average
Sacramento Metro	2.7 tpd average	3.0 tpd average
South Coast	10.7 tpd average	5.1 tpd average

These percentage reductions are equivalent to the following emission level goals.

	1994 pesticide measure	**Court Order**
San Joaquin Valley	17.8 tpd average	15.5 tpd average
Southeast Desert	0.9 tpd average	0.6 tpd average
Ventura	3.0 tons/day average	2.6 tpd average
Sacramento Metro	2.2 tpd average	2.4 tpd average
South Coast	8.6 tpd average	4.1 tpd average

DPR will adopt and submit fumigant regulations to meet the Court's emission goals in 2008. However, the State is seeking to amend the SIP to substitute a ton-per-day (tpd) of VOC reductions from other sources in 2008 for one tpd of the VOC reductions from pesticide use targeted by the 1994 SIP. Upon U.S. EPA approval, the State will ask the Court to modify its order accordingly. This Plan assumes the one-ton substitution, though the field fumigation regulations, as currently proposed, do not.

The Pesticide VOC Emission Inventory

Under the 1994 SIP, DPR prepares pesticide VOC emission inventories annually. The emission inventory determines the amount and characteristics of pesticide VOC emissions each year. The inventory is crucial for tracking the progress of efforts to reduce pesticide VOCs emissions and for identifying additional opportunities to do so.

The inventory is calculated by multiplying the VOC emission potential (EP) of each product by its use in pounds. DPR relies on Pesticide Use Reports (PURs) to determine the amount of each pesticide product that is applied. The potential emission for a pesticide application is currently calculated as:

VOC emission (pounds) = pounds pesticide product applied x EP

where the EP is the emission potential of the pesticide product. The EP is a measure of the volatile organic compound content of a product.

Agricultural and commercial-structural users of pesticides must report their use. (*See* Cal. Code of Regs., tit. 3, § 6626.) In the inventories published to date, the various EPs are based on each product's VOC content. The currently accepted method to determine VOC content is thermogravimetric analysis (TGA).[1] Where the Department lacks TGA data, for example because a product is no longer registered, it uses one of several alternative

[1] In February 2005, DPR used its authority to reevaluate registered pesticides to obtain TGA data for about 600 registered pesticide products.

methods to estimate a product's VOC content, such as water subtractions, inorganic subtractions or the assignment of default values. The "subtraction" methods assume that all product components except water or inorganic materials are VOCs. The default value for a particular product is established by determining the median VOC content of other pesticide products in the same formulation category (e.g., emulsifiable concentrate, flowable concentrate, dusts and powders).

Through improvements in data evaluation and collection, the Pesticide VOC Inventory has been improved since its inception. DPR initiated major revisions to the pesticide volatile organic chemical (VOC) emission procedures in 2002 (Spurlock, 2002a). Numerous updates and improvements to the VOC inventory calculation procedures have been made since that time (Spurlock, 2002b, 2004, 2005, 2006; Roush, 2006). The revisions have improved the accuracy of DPR's VOC inventory relative to earlier versions (e.g., Spurlock, 2002c).

Additional factors beyond product composition effect emissions under actual use conditions. In recognition of this, the 1994 pesticide element of California's State Implementation Plan (SIP) contains a provision for incorporating new knowledge into pesticide VOC emissions estimation procedures.

"The 1990 baseline year and subsequent year estimates may be further adjusted by additional VOC Emission Factors if additional information becomes available regarding the reactivity of compounds, the impact of temperature, moisture, deposition substrate, method of application, and other factors. Any additional VOC Emission Factor(s) will be pesticide product specific." (DPR, 1994).

Fumigants are among the highest VOC contributors due to both their high levels of use and their high emission potentials. The most recent emissions inventory, covering up to 2004, assigns emission potentials of 100% to products containing the fumigants 1,3-dichloropropene, chloropicrin, and methyl bromide. (Roush, 2006) In other words, it assumes that all of these fumigants that are applied are eventually released to the air. Similarly, the emission potentials for metam-sodium, N-methyl dithiocarbamate (metam-potassium), and dazomet products assume 100% conversion to methyl isothiocyanate (MITC) followed by release of 100% of MITC to the air. The emission potentials for sodium tetrathiocarbonate products assume 100% conversion to carbon disulfide followed by release of 100% of carbon disulfide to the air.

DPR has conducted numerous fumigant field monitoring studies over the last 15 years (e.g. http://www.cdpr.ca.gov/docs/dprdocs/methbrom/pubs.htm). Other researchers have also published fumigant field study results in peer-reviewed literature. Those studies demonstrate that the assumption of 100% fumigant emission to the air is inaccurate in most cases. DPR has developed application method adjustment factors to more accurately account for fumigant emissions under field conditions.[2]

DPR will submit its fumigant emission potential adjustments for peer review and public comment, and may make additional adjustments after these reviews are complete.

[2] Pesticide Volatile Organic Compound (VOC) Emission Adjustments for Field Conditions and Estimated VOC Reductions – Initial Estimates. April 6, 2007. Memorandum from Terrell Barry, Frank Spurlock and Randy Segawa to John Sanders, Branch Chief, Environmental Monitoring Branch, DPR.

Moreover, DPR will likely incorporate data from new studies as they become available and revise the adjustments periodically. Research is also in progress on methods to more accurately estimate VOC emissions from non-fumigant pesticides, such as emulsifiable concentrates. This work may provide the basis for DPR to develop adjustment factors for field emissions of other pesticides. DPR will also consider emission inventory adjustments and control measures based on the reactivity of pesticides. Recent research on reactivity of certain pesticides (Carter and Malkina 2007) demonstrates wide variation in the propensity of pesticidal VOCs to create ozone.

The most recent pesticide VOC emission inventory shows the following:

- Emissions in the Sacramento Metropolitan and South Coast non-attainment areas (NAAs) are below targeted levels. Pesticide VOC emissions decreased in these areas from 2003 levels.
- Emissions in the San Joaquin Valley and Ventura NAAs increased from 2003 to 2004; and exceed targeted levels.
- Emissions in the Southeast Desert NAA decreased slightly in 2004, but still exceed targeted levels.

II. PLAN TO REDUCE PESTICIDE VOC EMISSIONS

DPR will focus on fumigants and emulsifiable concentrates (ECs) because products with those formulations collectively cause the greatest VOC emissions from pesticide use in any given NAA. For example, fumigant use accounts for over 50% of the San Joaquin Valley pesticide VOC emissions inventory, while liquid ECs (particularly chlorpyrifos products) contributing approximately 30 percent**.**

DPR plans to promulgate regulations that restrict fumigant emissions, establish regulatory standards for the registrations of certain liquid pesticide products, and promote pest management practices and technologies that reduce pesticide use.

Reducing Fumigant Emissions

2008 Fumigant Regulations

Products containing the fumigants 1,3-dichloropropene, chloropicrin, methyl bromide, and compounds that generate methyl isothiocyanate comprise the majority of the pesticide VOC emissions in the San Joaquin Valley, Southeast Desert, and Ventura NAAs. Thus, reducing fumigant emissions results in significant VOC reduction achievements in these areas. DPR will meet its existing SIP reduction goals through the 2008 field fumigation regulations.

DPR will commit in the SIP to promulgate regulations to reduce VOC emissions by certain amounts in certain areas in 2008. Once those regulations are promulgated, they will be submitted to U.S. EPA for inclusion in the SIP. These regulations have been designed to achieve and maintain the following emission levels.

TABLE 1: Pesticide VOC emission levels targeted by the 2008 Fumigant Regulations.

San Joaquin Valley*	15.5 tpd
Southeast Desert	0.6 tpd
Ventura	3.6 tpd
Sacramento Metro	2.4 tpd
South Coast	4.1 tpd

* Areas are those described in Title 40 of the Code of Federal Regulations section 81.305, 1-hour ozone chart.

The 2008 fumigant regulations will achieve these targets by restricting allowable application methods and setting limits on the total VOCs that may be emitted from field fumigation as follows:

TABLE 2: Regulatory limits on VOC emissions from field fumigation

Ozone NAA*	**Total pounds of VOC emissions from field fumigation from May 1 to October 31**
San Joaquin Valley	1,400,000 lbs (3.8 tons/day average)
Southeast Desert	120,000 lbs (0.3 tons/day average)
Ventura	1,000,000 lbs (2.9 tons/day average)
Sacramento Metro	440,000 lbs (1.2 tpd average)
South Coast	1,000,000 lbs (2.7 tpd average)

Currently the San Joaquin, Southeast Desert, and Ventura areas exceed these field fumigation emission limits. Thus, the 2008 fumigant regulations will allocate emissions in each of those areas to ensure that total fumigant VOC emissions are brought down to, and remain below, their respective emission limits. The regulations will require tracking and reporting fumigant emissions within each of the five control areas. Emissions will be differentiated based on the particular application method. The regulations will allow only certain application methods, and specify the emission factor associated with each fumigant and method.

Currently, the Sacramento Metro and South Coast areas are well below their total fumigant emission limits in the regulations. Thus, the 2008 regulations will not initially require the Director to allocate fumigant emissions in those areas. However, the regulations will limit the application methods allowed, and require tracking and reporting of fumigant VOC emissions, in all of the areas. If the Sacramento Metro or South Coast areas exceed their fumigant emission limits, the regulations will require the Director to establish allocations for those areas as well. In addition, the regulations will allow the Director to establish allocations in the Sacramento Metro and South Coast areas if he or she deems it necessary to prevent those areas from exceeding their fumigant emission limits in the future.

The exact content of the 2008 fumigant regulations may change during the rulemaking process. However, regulations the DPR ultimately implements will be sufficient to meet the Department's commitments.

Additional Potential Fumigant Emissions Reductions

The 2008 regulations will create a framework and foundation for securing additional emission reductions in the future. The absolute limit on fumigant emission will spur development of practices and technologies that reduce fumigant emissions on a per acre basis. The fumigant regulations will require that any new method of application have a lower emission factor than currently approved methods. The expected reductions in emission factors will be 5-20%. In addition, the process for allocation of emissions gives the Director a mechanism to secure reductions in the absolute amount of fumigant VOC emissions.

Modification of application methods will reduce VOC emissions associated with fumigant use. DPR will propose changes that include conversion of shallow injection methods to chemigation using drip irrigation systems for 1,3-dichloropropene, chloropicrin, and metam applications; post-fumigation water treatments for 1,3-dichloropropene, chloropicrin and metam applications; and tarping of all methyl bromide fumigations.

For most crops, fumigants are commonly applied prior to planting using tractors equipped with shanks to inject the fumigant below the soil surface. Fumigants are usually injected at "shallow" depths (6 – 12 inches below the surface) for row crops such as strawberries, carrots, and tomatoes, while tree and vine crops are usually injected at "deep" depths (18 – 30 inches below the surface). Laboratory and field research demonstrate that changes to the typical injection methods can achieve significant VOC reductions. For example, fumigation using drip chemigation methods have 20 – 80 percent lower VOC emissions than injection methods, depending on the fumigant and specific injection method. Water treatments following fumigation also reduce VOC emissions by 20 – 80 percent, for most, if not all, fumigants and application methods. The volatility of methyl bromide precludes use of chemigation methods, but tarping reduces VOC emissions approximately 30 percent for most injection methods.

Currently, standard field fumigation costs range from about $400 per acre to over $2000 per acre depending on the active ingredient and application method (Table 3). Conversion to these lower emission methods will have associated costs (Table 4).

TABLE 3. Standard fumigation costs

Product	**$/lb.AI**	**Per acre costs***
Methyl Bromide	$3.50	$2100 (350 lbs/ac, broadcast shank, tarped)
Chloropicrin	$3.00	$1400 (200lb/ac, broadcast shank, tarped)
Telone (1,3-D)	$1.40	$550 (35 gal/ac, broadcast shank)
InLine (1,3-D for drip)	$2.40	$640 (25 gal/ac, drip application)
Metam Sodium	$1.00	$400 (75 gal/ac, shanked, water seal)

*Includes both fumigant and application costs

TABLE 4. Costs and benefits of conversion to reduced emission practices

Fumigant application method	Fumigant	Increased $/ac	Acres (average cumulative acres 2003-2005)*	Estimated total cost of conversion	Potential VOC Reduction
Convert to drip application from shank injection (drip system already in place)	1,3-dichloropropene (includes Chloropicrin)	$510[3]	SJV= 27,640	$14,096,400	20 – 80%
			Riverside= 774	$394,740	
			Ventura= 4,227	$2,155,770	
	Metam[4]	$510	SJV= 97,110	$49,526,100	20 – 80%
			Riverside= 3,506	$1,788,060	
			Ventura 2,181	$1,112,310	
Convert to drip application from shank injection (including installation of drip system)	1,3-dichloropropene (includes Chloropicrin)	$2510[5]	SJV= 27,640	$69,376,400	20 – 80%
			Riverside= 774	$1,942,740	
			Ventura= 4,227	$10,609,770	
	Metam	$2510	SJV= 97,110	$243,746,100	20 – 80%
			Riverside= 3,506	$8,800,060	
			Ventura 2,181	$5,474,310	
Post-application water treatments (sprinkler system already in place)	1,3-dichloropropene (includes Chloropicrin)	$10[6]	SJV= 27,640	$276,400	20 – 80%
			Riverside= 774	$7740	
			Ventura= 4,227	$42,270	
	Metam	$10	SJV= 97,110	$971,100	20 – 80%
			Riverside= 3,506	$35,060	
			Ventura 2,181	$21,810	
Post-application water treatments (including rental of sprinkler system	1,3-dichloropropene (includes Chloropicrin)	$240[7]	SJV= 27,640	$6,633,600	20 – 80%
			Riverside= 774	$185,760	
			Ventura= 4,227	$1,014,480	
	Metam	$240	SJV= 97,110	$23,306,400	20 – 80%
			Riverside= 3,506	$841,440	
			Ventura 2,181	$523,440	
Tarping – methyl bromide	Methyl Bromide	$400[8]	Trees & Vines Only		30%
			SJV= 16,898	$6,759,200	
			Riverside= 30	$12000	
			Ventura=32	$12800	

DPR also has plans to further regulate fumigant use by 2014 and 2023, including

- Air toxin controls on chloropicrin and metam sodium implemented before 2014.
- Regulations that reduce pesticide VOC emissions from chamber fumigation by 50 percent by 2014 and by 90 percent by 2023.

Further, DPR will pursue all avenues to reduce the reliance on fumigants.

Overall these additional measures are expected to reduce fumigant VOC emissions by a one ton per day (tpd) in the San Joaquin Valley area, and about half a tpd in Ventura

[3] Materials and installation costs: tarp + drip tape = $500, water = $10 for 3 x ¼ inch applications within two days after fumigation
[4] Metam = metam-sodium, and potassium N-methyldithiocarbamate
[5] Materials and installation costs: tarp + drip tape $500, water = $10, Install drip system $2000
[6] Water: $10/ac in. for 3 x ¼ inch applications within two days after fumigation
[7] Sprinkler rental = $200 and setup = $40; (purchase sprinklers about $2000/ac).
[8] Tarp and application = $400

beyond the reductions that will be achieved through the 2008 regulations. When the additional regulations are developed and the resulting reductions can be quantified with more confidence, DPR intends to transmit those regulations to the Air Resources Board (ARB) for inclusion in the SIP, if needed to meet applicable air quality standards.

Anticipated Fumigant Emissions

Table 5 reflects the Department's current best estimates of fumigant emissions upon implementation of this Plan.

TABLE 5: Forecast of fumigant emissions in specific areas, May - October (tons/day)

Nonattainment Area	**2008**	**2014**	**2023**
Sacramento	0.1	0.1	0.1
San Joaquin Valley	3.8	3.3	2.8
Southeast Desert	0.30	0.3	0.3
Ventura	2.9	2.7	2.5
South Coast	0.7	0.7	0.7

Reducing Non-Fumigant Emissions

The Department will implement a variety of means to reduce VOC emissions from non-fumigant pesticides.

Reformulation of Liquid Emulsifiable Concentrates

DPR intends to use its authorities to establish regulatory standards that reduce the content of ozone forming compounds in pesticide products. DPR will build upon a regulatory effort to reduce the overall VOC content of liquid emulsifiable pesticide products that began in 2005. In 2005, the Department initiated a reevaluation of more than 700 pesticide product registrations, aimed at reducing the VOC content of liquid emulsifiable concentrates to below 20%. Of the over 700 pesticide products formulated as liquid emulsifiable concentrates targeted in the 2005 reevaluation, less than 150 remain with VOC content over 20%. Between 2008 and 2015, DPR will continue to evaluate the remaining pesticide products that contain more than 20% VOC. By 2014, DPR expects fewer than 10% of registered products to have a VOC content above 20% based on the TGA method. Certain products (e.g., pheromones) may be unable to remove their volatile components.

DPR relies on the TGA method to determine the relative VOC content of pesticide products. Although a valid method to determine volatiles, the TGA method also captures compounds that do not appreciably contribute to ozone. DPR will continue to rely on the TGA method to determine the VOC content of liquid products, but intends to focus regulatory actions on chemicals that have a high potential to contribute to ozone formation ("highly reactive"). The reformulation standards will target the overall formulation of pesticide products, not necessarily the active ingredient. Non-pesticidal compounds typically comprise more than 90% of the content of liquid pesticide products.

The first phase will involve developing information about the reactivity of specific compounds used in formulation of pesticide products. By 2014, the Department intends to promulgate regulations to control the reactivity of liquid pesticides. These regulations

may allow the director to refuse to register, or cancel the registration of, pesticide products that include specific, highly reactive chemicals, or they may set an overall reactivity standard for registration of pesticide products.

In setting the regulatory standards for product formulations, DPR will pay careful attention to any potential adverse environmental effects. For example, if specific product components significantly lower efficacy compared to what they are replacing, the result could be an increased number of applications to achieve a comparable level of pest management. DPR would consider the emissions increase associated with additional applications, including increased use of application equipment such as tractors or airplanes. Also, DPR must evaluate the impact of these regulatory actions on human health and the environment.

The Department will be better able to estimate emission reductions from this measure in 2010, after it identifies the specific reactive compounds and use of products formulated with them. DPR's preliminary estimate is that the product registration standards would reduce VOC emissions by about a one ton-per-day in the San Joaquin Valley nonattainment area. When the reformulation program is further developed and the resulting reductions can be quantified with more confidence, DPR intends to transmit those regulations to the Air Resources Board (ARB) for inclusion in the SIP, if needed to meet applicable air quality standards.

Non-regulatory Strategies

DPR will look for opportunities to enter into formal "strategic partnership" agreements that implement integrated pest management (IPM) and innovative, low-emission technology (described below). These partnerships will provide for reductions, and the tracking and verification of those reductions, in exchange for incentives, such as cost-sharing. VOC emissions by commodities are currently tracked and reported in the annual emission inventory, which is based on pesticide use reports.

DPR intends to use Pest Management Alliance grants to fund the necessary incentives. That grant program is currently funded at $585,000 each year for the next two years. DPR will continue to request the necessary funding for this program in the future.

By 2014, DPR hopes to establish strategic partnerships with approximately 7 commodity groups that contribute about 80% of the pesticide VOC emissions. DPR estimates that the promotion of lower VOC practices will reduce VOC emissions by about a ton-per-day in the San Joaquin Valley nonattainment area by 2023. When this program is further developed and the resulting reductions can be quantified with more confidence, DPR intends to submit it to the Air Resources Board (ARB) for inclusion in the SIP, if needed to meet applicable air quality standards.

Integrated Pest Management

The agricultural industry, pest control industry and the university research community have a proven history of improving pest management practices to meet environmental and health concerns. Year-round IPM guidelines have been developed by the University of California Statewide Integrated Pest Management Program (UC IPM) for several major crops: alfalfa, almonds, avocados, cotton, peaches, pears, plums, prunes, nectarines, tomatoes, and grapes. Pest management programs for strawberries, walnuts,

citrus and pears are under development. These management programs apply to crops that account for more than 80% of all non-fumigant pesticides applied in the San Joaquin Valley NAA. These guidelines reduce pesticide use by providing alternate management strategies including cultural practices, pest monitoring, and judicious use of pesticides when needed. As an example of the potential reductions available, the almond pest management alliance (in part funded through DPR grants) achieved 20% reduction of total pounds of pesticide applied per acre in the project area through the use of IPM practices. Many commodity groups have undertaken the development of industry specific crop profiles and pest management plans.

In addition, a web-based program designed to assist in selecting pesticides and practices appropriate to a wide range of conditions is currently being developed. This computer based decision-making tool incorporates VOC emission reductions in the alternatives analysis. These decision-making tools can aid in the implementation of IPM methods that reduce pesticide use and ultimately reduce VOC emissions.

Adoption of Innovative Technology

Innovative technologies enable pesticide applicators to reduce pesticide use by applying pesticides with more precision and efficiency. Increased application precision and efficiency would in turn reduce VOC emissions. Equipment designed to improve non-fumigant pesticide application efficiency include:

- special spray nozzles;
- electrostatic spraying systems;
- positive shutoff valves that prevent leakage; and
- controlled droplet application (CDA).

Variable rate pesticide application technology to implement application precision:

- operator-controlled rate adjustment;
- built in application sensors, target sensing sprayers;
- high resolution field mapping of pests and disease (with or without geographic information systems[GIS] capability);
- guidance and steering technology using global positioning system (GPS) to control variable rate pesticide application; and
- remote sensing for precision pesticide application.

Innovative technology generally has shown an ability to reduce pesticide use from15% to 80%. One example, the SmartSprayer (ultrasonic sensors) technology, is used in orchard cropping systems. Published data on pesticide savings have demonstrated 15% to 45% reduction in pesticide use without loss of efficacy. If there were a 30% reduction in use and adoption by 30% of orchard acreage, VOC emissions would be reduced by 0.2 tons/day in the San Joaquin Valley. Another example of a target sensing sprayer is the

WeedSeeker (photometric sensors) and similar sprayers that are generally used for applications of herbicides in orchards and vineyards in California and to a lesser extent for field crops such as alfalfa, cotton and tomatoes. Outside California, these weed-sensing sprayers are mainly used in fallow fields and rights-of-way. Thus, agricultural use of this technology on ditch banks and roadsides in California may also be expected to increase. Published data demonstrate 50% to 80% reductions in pesticide use. If there were a 65% reduction in use of herbicides for these commodities/sites and adoption by 30% of the acreage, VOC emissions would be reduced by 0.2 tons/day in the San Joaquin Valley.

DPR may pursue certification procedures for spray equipment as a mechanism to help growers maintain efficient pesticide application. Equipment used in pesticide application generally must be in good working condition and adequately calibrated to achieve maximal efficiency. Periodic evaluation of spray equipment for condition and calibration would minimize drift, VOC emissions, and reduce inefficiencies that may occur during pesticide application.

Anticipated Non-Fumigant Emissions

The Department's current best estimate of non-fumigant emissions upon implementation of this plan is as follows.

TABLE 6: Estimated non-fumigant VOC emissions in specified years, May – October (tons/day).

Nonattainment Area	2008	2015	2023
San Joaquin Valley	11.7	10.7	9.7

III. SUMMARY OF ESTIMATED REDUCTIONS FROM THE PLAN

The following tables summarize the Department's best current estimates of the reductions resulting from this plan. DPR will continue to calculate VOC emissions from agricultural and commercial structural pesticide use each year as accurately as possible.

TABLE 7: Pesticide VOC Emissions (May – October average, tons/day)

Area	**Current Emissions (2004)**	**Anticipated Reductions**
Sacramento Metro	1.3	None*
San Joaquin Valley	17.9	5.5
Southeast Desert	1.0	0.4
Ventura	4.8	1.6
South Coast	1.9	None*

* DPR expects reductions already achieved in Sacramento and South Coast to continue. The 1994 plan target were met in the Sacramento Metro NAA largely due to the replacement of the rice herbicide molinate by propanil. U.S. EPA is phasing out molinate, though it remains the highest pesticide VOC contributor in this NAA. Rice growers are using increasing amounts of propanil instead. In 2004, DPR adopted regulations (Cal. Code of Regs., tit. 3, § 6462) that prohibit the use of emulisifiable concentrate formulations of propanil as a drift control measure, which also reduces VOC emissions. In South Coast, loss of agricultural acreage should continue the trend of decreasing pesticide VOC emissions.

TABLE 8: Estimated Reductions From Fumigant Regulation (May – October average, tons/day)

Area	2008	2014	2023
Sacramento Metro	0	0	0
San Joaquin Valley	2.5	3.0	3.5
Southeast Desert	0.4	0.4	0.4
Ventura	1.2	1.4	1.6
South Coast	0	0	0

TABLE 9: Estimated Reduction in the San Joaquin Valley From Non-Fumigant Measures (May – October average, tons/day)

Measure	2014	2023
Reformulation	1.0	1.0
IPM and Technology	0	1.0

IV. REFERENCES

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